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E D I T O R I A L S

Hello once again from KB9BVN. This is the first issue of volume 2 of the Fidonet HAM/PACKET digest. I hope you enjoy the articles that are appearing this month. This month I received a total of 8 reader surveys, you might remember those as they were distributed with V1#6 and V1#10. I appreciate the input, and could always use more. If your Radio Club would like to exchange newsletters, why not give them a copy of this one, and have them mail a copy of theirs to the following address.

Brian Murrey - KB9BVN
PO Box 47453
Indianapolis IN 46247

Thank you!

Volume 2, Number 1 April 23, 1990

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B U L L E T I N S

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QEX -The ARRL Experimenter's Exchange- 03/90

Gateway Column

Conducted by: Stan Horzepa, WA1LOU

PROTOTYPE 905-MHZ DIGITAL RADIO COMPLETED

The first prototype 905-MHz "user" digital radio has been completed. The intent of the prototype phase was to arrive at a reproducible design using readily available components which could provide good performance at low to moderate cost. These radios are intended to provide moderate speed, 250 to 500 kbit/s, user access to an Amateur Radio network.

The prototype radio consists of four boards, PA, LO, RX and TX, mounted on a U-shaped chassis. This modularity was used to facilitate design; the pilot run design will be more integrated. The present effort involves laying out two PC boards, one for the PA and another containing the entire low-power radio, power and control circuits. It all appears to fit in a 5- x 7-inch enclosure with a top consisting entirely of a heat sink. Interface to the radio is differential ECL: TXD, RXD, RTS, DCD and S-meter output, antenna connecor and 12 V dc @ 0.3A on receive and under 4A on transmit.

An attempt was made to produce local oscillator signals of good signal purity and stability. This was thought to be important since similar radios will probably be used in the near term at backbone IP switch sites and will need to operate in congested RF environments. There has also been some thought given to full- duplex operation of this hardware, but such operation is not being considered at this time. Dual outputs of +10 dB at approximately 96 MHz and 764 MHz are provided for transmitter and receiver mixing. Both output frequencies are derived from a single crystal oscillator. Spurious signals are below -80 dB.

Transmitter output power is in excess of +41 dB (12 watts) with modulation related sidebands down at least 70 dB (at 250 kbauds, modulation index equal to 1.4) at the edges of a 2-MHz wide, 905-MHz centered channel with out of band spurious performance also over 70 dB down (this excludes the second harmonic which is approximately -60 dB). Suppression of adjacent-channel interference is achieved by control of the deviation and an active filter ahead of the VCO tuning input. The VCO is presently free running at 45 MHz and doubly converted up to 905 MHz. This provides 905-MHz output frequency stability and accuracy essentially the same as that of the 45-MHz VCO alone. This performance seems acceptable, but alternative plans are being considered for providing complete crystal derived frequency accuracy along withfast transmit start-up and 0.5

Mbaud sorts of modulation, if necessary. The present architecture has the advantage of being easily adapted to transverter operation by a slight change of the crystal frequency and the substitution of a multimode HF transceiver for the 45-MHz VCO and receiver demodulator circuits.

The receiver has good BER down to below -90 dB. Turnaround time is better than expected. Since adding a little design effort to the switching circuits, it is now possible to square-wave modulate the RTS (PTT) line at rates of several kilohertz and generate a clean RF square wave at full power. In between these square-wave 12-watt output pulses, the receiver is able to demodulate a -90 dBm signal applied to the same antenna connector (with a 30-dB power attenuator inserted to protect the signal gen generator). The receiver is fully alive less than 40 microseconds after the falling edge of RTS. It is truly a "packet radar" and calculations show that with an 8-foot TVRO dish antenna or something similar, the radio should be able t copy its own packets reflecting off a 747 aircraft at a 4 to 10 miles distance. In normal use, the radio should easily be back on receive before the previously transmitted packet has reached a distant node. The first pilot run is expected to be twelve radios and will undoubtedly reveal some areas where change can improve performance and reduce cost. Some thought is being given to a "one-board" lower power radio which can plug into a PC slot. To reduce cost, such a radio might use the phased-lock of an on- hannel FSKed VCO instead of the dual conversion approach.

PC board design is presently in progress for the pilot run radios. It is anticipated that these will initially be used as backbone/switch radios as well as for user access radios as a part of the prototype Northern California moderate speed IP network now being constructed. Plans have not yet solidified for construction of additional radios, but it is expected that the next design effort will be aimed at providing similar radios for ee digital allocations at 1249, 1251 and 1298 MHz.

by Glenn Elmore, N6GN

TEXNET-TNC 2 FIRMWARE ON THE HORIZON

Some of you may have heard rumors of the effort to transport the TexNet software to TNC 2s, which would support smaller "feeder"

networks to link to the larger long-haul backbone networks, among other uses. This effort continues and second beta testing is underway and going very well. No releases are yet available.

SOFTWARE DEVELOPMENT REPORT

Some of you might be wondering what we (Harold Price, NK6K, and Bob McGwier, N4HY) are doing with the MICROSATs and why you can't connect up yet.

The development cycle for these launches was very short. Most

of the time available for software development, beyond getting the basic operating system and I/O drivers running, was in writing support code for ground-based hardware heck-out. A fully operational CPU wasn't mated to a fully operational spacecraft until very late in the game. After that, much of the available software time went into qualifying the ROM-based bootloader. Given the short time available, the goals were to:

1) Check out all of the hardware on the ground.

2) Have the best chance possible of getting good telemetry as soon as possible once the spacecraft reached orbit.

This resulted in a limited-feature, but very reliable set of launch support software. This is the sftware that was running when the transmitter-on commands were sent.

Once the satellites were in orbit, several shortcomings in the high-level software loader and the battery management routines were seen. Bob and I have been working to fix these, in addition to commissioning the ground-stations which have never talked to MICROSATs before, and spacecraft which have never talked to the ground before, times 4. Once procedures are worked out, they are documented so that new command stations can be broughton line.

Here is a typical day in the life of Bob and Harold. Each day has been like this since launch (times approximate).

1200-1600 UTC: Bob wakes up, reads the mail from Harold for the previous night's passes, copies the early passes, checks the action of the software loaded last night, reconfigures the

spacecraft as required, finishes testing the new command and control software for the next spacecraft, and sends it to Harold.

1500-1800 UTC: Harold wakes up, reads the mail from Bob, gets the new command andcontrol software from Bob, integrates it with the new loader code, and tests it on the spacecraft CPU simulator.

1800-2000 UTC: Harold goes to TRW, starts the upload of the new software to the spacecraft (this is a bit tricky, which is why a new loader is being sent). The TRW ARC crew tapes or copies the other spacecraft in real-time. Harold reviews all of the telemetry for all of the spacecraft.

2200 UTC: Harold sends .EXE, which was partially uploaded to Bob to finish the uploading, sens a list of the diagnostic variables to the WEBERSAT ground-station crew to download on their next orbits or calls them to coordinate the use of uplinks to allow the WEBERSAT ground-station crew to access their experiments.

2200 UTC: Bob prepares and tests the new command and control software for the next spacecraft. Harold works on making the

ground upload software distribution. The WEBERSAT ground-station crew tests the final camera code on the software simulator at Weber in preparation for it sending to Harold to run on the hardware simulator.

0100-0400 UTC: Bob completes the upload of the new software, prepares the source code for the next spacecraft for the start of the new cycle, answers fan mail, and calls Harold to confirm that the software is uploaded.

0400-0600 UTC: Harold goes back to TRW, holds his breath, tells the spacecraft to terminate the old program and start the new one, calls Bob to discuss the day, and gets a call from Weber on the diagnostic values. Bob goes to bed.

0600-0800 UTC: Harold and the TRW ARC crew tape or copy the other spacecraft in real-time and review all of the telemetry for all of the spacecraft. Harold puts the status message on Telemail.

1200 UTC: Bob wakes up and starts again.

Coming events: Harold and Bob polish their resumes as the above schedule leaves no time to pick up their pay checks, let alone do work. Once the basic hardware is checked out and the batteries are in good shape, this frantic schedule will change. And once the loader and command software are tweaked for the last time, they will be turned over to the production command groups, hopefully by the beginning of February.

The next goal is to load the application software. Weber will be ready to do that in a few days. I have to take a business trip and more development needs to be done, which will delay the uploading of the first user-access software until late February. This will allow time for the final hardware check-out, which will include memory tests on the 8-Mbyte of mass memory, determintion of the channel center frequencies, required uplink power, and the like.

by Harold Price, NK6K

SOFTWARE FOR THE PACKET-RADIO STATION

Lately, a lot of new and updated software for the packet-radio shack has become available. A synopsis of these programs follows. APLink Version 3.94, the IBM PC AMTOR mailbox/packet-radio BBS software package, fixes a minor bug in the packet-radio log-off routine. The software is available on disk from TAPR.

Atari TCP/IP (KA9Q's NET) has been released by PE1CHL in a new version for the Atari computer. It is available directly from PE1CHL, however, TCP/IP fans in the US can obtain it by sending two double-sided or three single-sided disks, a self-addressed

stamped disk mailer and a note stating what you want to Mike Curtis, WD6EHR, 7921 Wilkinson Ave, North Hollywood, CA 91605-2210.

from Julian Macassey, N6ARE

DOSgate Version 1.13 is now available. This version should be compatible with most TNCs and has been tested with the AEA and

Kantronics TNCs. DOSgate is an IBM PC program that allows any remote packet-radio user to connect to and use a PC compatible computer as if the user was sitting in front of the PC (see Gateway, Volume 5, Number 23). To obtain a copy of DOSgate, send a 360-kbyte formatted 5-1/4-inch DOS disk, a self-addressed stamped disk mailer and your request for DOSgate to Rich Bono, NM1D, 7 Redfield Cir, Derry, NH 03038.

DRSI TCP/IP PC-Packet Driver is available in a new version that fixes all of the reported bugs in the earlier releases, nowsupports the NOS version of TCP/IP and marks the first release of the source code for the DRSI drivers. The pexecutables and DRSI driver source files may be downloaded from CompuServe's HamNet (file name: DR_NOS.ZIP) or may be obtained on disk from DRSI, 2965 Range Rd, Clearwater, FL 34625. G4YFB Packet Mailbox Version 3.24 for the IBM (C and compatibles may be downloaded from CompuServe's HamNet (file name: YFB324.ZIP). G8BPQ Packet Switch Version 3.53 has a number of changes and enhancements including a remote SYSOP feature for etering route/node information, node CTEXT for users accessing the switch via its alias, a BYE command and STATS information.

from Carl R. Finke, WB5DDP, via CompuServe's HamNet

KC8JN PBBS Version 8.21 for the Radio Shack TRS-80 Model I, III or IV (in the III mode) includes reverse-forwarding and BID store-and-forward. It is available by sending three unformatted 5-1/4-inch disks plus $2 (to cover mailing and documentation costs) to Bill Ritchie, N8FIS, 725 Rawson Ae, Fremont, OH 43420. Note that Bill is only able to copy the Model III disks because he does not own a Model I; anyone that wants to run this program on a Model I will have to convert it themselves.

MSYS Version 1.06, the IBM PC and compatible multiuser, multiport PBBS with support for TCP/IP, gateways and packet-radio clusters may be downloaded from CompuServe's HamNet.

PRMBS Version 1.05, the ROSE packet-radio mailbox and server for the IBM PC and compatibles fixes two major problems: the crash-inducing response to a non-standard "Link State is" message generated by a Kantronics KPC-4 and the failure to detect carrier loss of a landline modem connection in the "super-user state." The software may be downloaded from CompuServe's HamNet. The software is also available on disk from TAPR.

W0RLI Mailbox Version 11.8 removes support for MBL3.13, port

types AEA and KAM, which is no longer required, and the line "?_name" from config.mb; fixes several cases of mail file corruption when GM. and several different TC hang situations; and adds the V command (like T with FLOW ON). The software's file name is FS1108.EXE and it may be downloaded from N1EDF at 508-949-3590 or WA6RDH at 916-678-1535. The software is also available on disk from TAPR.

WA7MBL PBBS Version 5.13 adds limited support to hierarchical-addressed messages. It may be downloaded from CompuServe's HamNet or via anonymous ftp on Internet from either tomcat.gsfc.nasa.gov (\public\bbs\wa7mbl) or biocat.chem.usu.edu (\pub). Its file name is MBL513.ARC. The software is also available on disk from TAPR.

Packet-Radio Satellite Tracking Programs

The recent launches of amateur packet-radio satellites has generated a lot of interest among packeteers worldwide. In order to use the satellites, it is necessary to know when they will be "visible" to your station. To find out when satellite visibility occurs, the following satellite tracking software is available from the Radio Amateur Satellite Corporation (AMSAT) at PO Box 27, Washington, DC20044, telephone 301-589-6062. Write or call AMSAT for pricing and ordering. Note that the software is discounted for AMSAT members.

"InstantTrack 1.00" for the IBM PC and compatibles was written by Franklin Antonio, N6NKF, and features speed, ease of use, instant visibility, real-time displays, automated orbital element entry and time-setting, satellite and station databases, a 1754 city database, grid square support, satellite co-visibility, squint angle, path loss, real-time rotor control, background moe, sun and moon tracking, fast rise-time finder, multiple station tracking and on-line help. "Orbits II" is for IBM PCs and compatibles with 256-kbyte of RAM memory, CGA and compatible monitor, one 5-1/4-inch floppy diskette drive and DOS 2.0 or later.

"Orbits III" is functionally equivalent to ORBITS II, but has been designed for use with EGA and an Enhanced Color Display. "Orbits IV" is the equivalent to ORBITS II, but has been designed for use with VGA.

"N4HY Quiktrak 4.0" is for IBM PCs with DOS 3.0 or later. An 8087 math co-processor is not needed, but the program will run much faster with it. CGA requires 512-kbyte of RAM, while EGA requires 640-kbyte of RAM.

"Quiktrak For IBM" is for IBM PCs without graphics capabilities. "C-64 Supertrac" for the Commodore C-64, combines N4HY's Quiktrak program and enhanced graphics. It provides sharp, clear and colorful graphics with excellent scheduling flexibility. This program also has the ability to drive commercially available dual-axis rotors. It is available on

disk only.

"Apple Quiktrak" is an Apple II menu-driven program for tracking and scheduling of amateur satellites. It incorporates a very fast algorithm for finding usable passes of the satellite of your choice. Satellite pointing angles relative to your QTH and a "window track" mode are included. The window track feature identifies mutual "windows" between your QTH and other specified locations around the world. It includes menu driven utilities fordata entry and requires an 80-column card and 64-kbyte of RAM.

"Satellite Helper," written by W7HR for the Apple Macintosh, provides tabular data output of tracking and scheduling information for up to ten satellites. Graphic displays include rectangular, polar and great circle world maps, and there is a "view" mode which shows the Earth as seen seen from the satellite at any time. A real-time mode displays data as it changes and is compatible with the KLM/Mirage antenna tracking interface. Data can be displayed on the screen or printed on an Imagewriter printer. A propagation prediction package is also included which calculates the maximum usable frequency (MUF) to any point, sunrise and sunset times, bearings and distances, and displays the gray-line. Satellite Helper requires 1-Mbyte of RAM. "C-128" is a version of the Orbits program that is written to take advantage of the unique capabilities of the Commodore C-128. It uses time-based incrementing with user-selected increments of time, which results in uniform time increments btween data lines. The program features automatic page formatting and pagination. As many as 20 satellites may be entered into Keplerian files. It requires an 80-column monitor and a Commodore compatible printer.

"Commodore Amiga" is designed for the Amiga operating in 80-column mode. It has the same features as C-128, but runs considerably faster. The program has provision for mode and phase programming to alert you as to which transponder is active. It requires 256-kbyte of RAM. "Quiktrak for TRS-80 Model 4/TRSDOS 6.0" is the N4HY Quiktrak program modified to run on the TRS-80 Model 4.

"W3IWI Tracking Program" is available for the following computers: Tandy/TRS-80 Color Computer 1, 2 and 3 (cassette or disk); TRS-80 Model 3 (32-kbyte of RAM, one disk drive); Atari 400 and 800 (disk only); Each program provides all of the data needed for tracking satellites, space shuttles, etc in an easily understandable tabular form.

"HP-41 Programmable Calculator Orbit I" will output azimuth and elevation in real-time or all W3IWI arameters in the prediction mode. Special requirements: HP-41C plus QUAD Memory, HP-41CV, HP-41CX; Card Reader is desirable, but not essential.

"HP-41 Programmable Calculator Orbit II" is the same as Orbit I with the addition of functions from the Time Module for output

of time and input from the time clock in a real-time mode.

IP ADDRESS COORDINATOR LIST UPDATE

The following list, courtesy of Brian Kantor, WB6CYT, may be used to update the regional IP address coordinator list that was published in Gateway, Volume 6, Number 7. (An IP address is required in order to use the KA9Q Internet Protocol Package for amateur packet-radio TCP/IP operation. Contact your region's coordinator for an address assignment.)

LOCATION	IP ADDRESS	IP ADDRESS COORDINATOR
US Coordinators		
CA: San Bernardino and Riverside	44.018	KE6QH
DC:	44.096	WA1IVD
ID:	44.012	K7JD
KS:	44.122	WI0/R
MI: upper peninsula	44.092	KD9UU
MN:	44.094	WD0/HEB

NJ: southern	44.065	WB2MNF
NY: upstate	44.069	WA2WPI
OR: northwestern and Portland	44.116	WS7S
PR:	44.126	KP4QG
WA: eastern	44.012	K7JD
WA: Vancouver	44.116	WS7S
WI:	44.092	KD9UU
WY:	44.086	WB7CJO

International Coordinators

Chile	44.157	Flavio Llanos c/o CE6EZG
France	44.151	FC1BQP
Portugal	44.158	CT1DIA
Spain	44.133	EA4DQX

GATEWAY CONTRIBUTIONS

Submissions for publication in Gateway are welcome. You may submit material via the US mail or or electronically, via CompuServe to user ID 70645,247 or via Internet to 70645.247@compuserve.com. Via telephone, your editor can be reached on evenings and weekends at 203-879-1348 and he can switch a modem on line to receive text at 300, 1200 or 2400 bit/s. (Personal messages may be sent to your Gateway editor via packet radio to WA1LOU @ N1DCS or IP address 44.88.0.14.) The deadline for each installment of Gateway is the tenth day of the month preceding the issue date of QEX.

A R T I C L E S

ACTIVE AMATEUR RADIO SATELLITES
as of 1 February 1990

Satellite	Mode	Uplink	Downlink
RS-10 (1)	A	145.860 - 145.900	29.360 - 29.400 MHz
	T	21.160 - 21.200	145.860 - 145.900
	K	21.160 - 21.200	29.360 - 29.400
	K/A	21.160 - 21.200 & 145.860 - 145.900	29.360 - 29.400
	K/T	21.160 - 21.200	29.360 - 29.400 & 145.860 - 145.900
	Robot	21.120 and/or 145.820	29.403
	Beacons		29.357, 29.403 145.857, 145.903
RS-11 (1)	A	145.910 - 145.950	29.410 - 29.450 MHz
	T	21.210 - 21.250	145.910 - 145.950
	K	21.210 - 21.250	29.410 - 29.450
	K/A	21.210 - 21.250 & 145.910 - 145.950	29.310 - 29.450
	K/T	21.210 - 21.250	29.410 - 29.450 & 145.910 - 145.950
	Robot	21.130 and/or 145.830	29.453
	Beacons		29.407, 29.453 145.907, 145.953
Oscar 10 (2)	B	435.050 - 435.155	145.850 - 145.955 MHz
	Beacon		145.810
Oscar 13	B	435.420 - 435.575	145.825 - 145.975 MHz
	J	144.425 - 144.475	435.990 - 145.940
	L	1269.330 -1269.620	435.715 - 436.005
	S	435.601 - 435.637	2400.711 -2400.747
	Rudak (4)	1269.710	435.677
	B Beacon		145.812 & 145.985
	J & L Beacon		435.651
	S Beacon		2400.325

Satellite	Mode	Uplink	Downlink
PACSAT	1200 bps PSK AX.25	not activated (5)	437.025 MHz 437.050 2401.10
DOVE	1200 bps AFSK/digital voice (6)		145.825 MHz 2401.22
WEBERSAT	1200 bps PSK AX.25	not activated (5)	437.075 MHz 437.100
LUSAT	1200 bps PSK AX.25	not activated (5)	437.150 MHz 437.125
UoSAT-D	1200 bps AFSK	not activated (5)	435.070 MHz
UoSAT-E	1200 bps AFSK	not activated (5)	435.120 MHz

Notes:

1 = RS-10 and RS-11 are mounted in the same spaceframe. They are part of the Soviet Cosmos 1861 communications and navigation satellite.
2 = The Oscar 10 beacon is an un,modulated carrier. Do not transmit to the satellite if the beacon is FMing or sounds 'raspy'.
3 = When Oscar 13 is in Mode JL, both of these transponders are in operation.
4 = As of this date, the Rudak experiment has not been implemented.
5 = User access to the Microsats has not been activated at this time.
6 = DOVE will not have user access. Instead, it will be transmitting digitized voice and AFSK AX.25 telemetry.

-+---

This information comes from:

AMSAT
Radio Amateur Satellite Corp.
P.O. Box 27
Washington, DC 20044
Telephone: 301-589-6062

Join today to support amateur radio of tommorrow!

Lithuania Needs Our Help!

The following was originally posted in the Fidonet Ham Radio echomail area. I have posted it here since I think it is important for us to lend a hand when we can

Brian Murrey

==========

From: Paul Petersen
To: All

BBNS - Radio ham's who are capable of establishing communication with stations in Lithuainia are asked to maintain a 24 hour vigil for obtaining news and informtion about the situation in that country. Recording of radio contacts is most important. Foreign journalists have been ordered out of the country. In 1939 a wholesale slaughter of the innocents was visited upon the people of the baltic countries and it was months before the free world learned of the events. Many people are fearfull that a similiar catastrope could happen again and hope that public opinion will hold back the soviet leadership. It is estimated that the soviet's brutally murdered 20 million people during the 1930's. We encourage you to contact the Associated Press 1-800-842-2068 or the Lithuanian Information Center in Washington DC (202)667-1980.

>>Origin>> BBNS - BBS On-Line News Service (203)645-1980

end of copied message

STAR TREK IV PACKETS? by Bob McGwier, N4HY

Several months ago, Harold Price, NK6K, challenged me to demodulate what he thought might be HF packets in Star Trek IV. During the scenes where Scotty is valiantly trying to beam both Chekov and Uhura back from the U.S.S. Enterprise, where they have been stealing Nuclear vessel high speed photons, Scotty is having a hard time hearing them. One of the sources of interference is what appeared to Harold to be HF packet.

Always being one to rise to a challenge, I took on the job of doing some fancy Digital Signal Processing footwork. Almost from the first I was certain that it must be an HF packet since my very first demodulator attempt clearly revealed flags before the start of a frame and end of frame was also clear. I knew it was HDLC of some variety. Several things impeded the effort, including Scotty's voice on top of the packets, some SSB from 20 meters was also nearly on top of the signal. All of this had to be filtered out. I spent an hour of time on the Cray-2 at work and used the fanciest FSK demodulator I could write and I finally had noisy baseband signal plotted on paper in front of me. I did my best to

get an integral number of samples per baud as the signal was very noisy, and though the bits could be made out by eye, I could tell that it was going to take another hour of Cray-2 time to get the clock recovered and to make good bit decisions.

In a couple of places, HDLC showed me what were clearly bit errors, and these could be done by eye as well. After the filtering, and building a demodulator for the badly mistuned signal (it was almost 900 Hz below `normal'), I took the bits to Phil Karn, KA9Q and he decoded the NRZI data and proved beyond a shadow of a doubt that it was indeed an HF amateur radio packet. It was WA8ZCN-0 sending an RR for NR-3 to N6AEZ on 20 meters. I got Bill Harrigill, WA8ZCN on the phone and he agrees that it was probably him. Thanks Harold for the challenge and Phil for the help.

Hamfest - Butler Pa.

The BREEZE SHOOTERS, Inc., an amateur radio club will hold their 36th Annual Hamfest, and Computerfest, Sunday, June 3, 1990 from 8:00 AM to 4:00 PM at the Butler County Farm Show Grounds, West of Butler, PA on PA Rt. # 68 between I-79 and PA Rt. # 8. A Hamfest or Computerfest is a electonic flea market for retail, wholesale, and every day vendors like you and I, with lots of great bargains.

There are many great amateur radio related prizes. Registration is $ 2.00 ea., 3 for $ 5.00, 7 for $ 10.00 and 15 for $ 20.00

Ham prizes are: 1st Icom IC-765 with power supply. 2nd Icom IC-725 with power supply. 3rd Icom IC-2400 2m/70cm mobile. 4th Icom IC-32at 2m/70cm handi-talkie. 5th Icom IC-228h mobile. 6th AEA PK-232 MBX with power supply. 7th Uniden 10m mobile. 8th Astron 35M power supply.

AND, of course 6 Icom IC-02gat handi-talkies for hourly prizes
AND, more hourly prizes
AND, as an added special treat ICOM-USA will host a ICOM DAY with factory representatives and extra prizes.

THERE IS NO BETTER HAMFEST IN THE WORLD FOR THE SMALL ADMISSION CHARGE OF $ 1.00. FREE PARKING AND FREE TAILGATE VENDING. UNDER ROOF TABLES AVAILABLE FOR $ 10.00. FOOD AVAILABLE AND MORE. DESIGNATED HANDICAPPED PARKING.

If enough interest is shown there will be a computer raffle. Present plans include seperate building for Amateur Radio (Ham) vendors, and Computer Vendors.

For more information please contact H. Rey Whanger, W3BIS, at phone 412/828-2330, to reserve tables contact George Artnak, at 833-3395.

HAM RADIO HISTORY

4 Billion BC - Earth is a swirling ball of flaming gases. Propagation is extremely poor.

1 Billion BC - First dry land appears. It is divided up into squares. County Hunters Club formed.

500 Million BC - Second patch of dry land appears. First DXpedition. Credit disallowed because of questionable licensing agreement.

400 Million BC - Flowering plants and grasses evolve. Telrex invents first beam antenna but sales area slow because of lack of suitable structures.

300 Million BC - First tree appears. It is immediately cut down, stripped of branches, placed in a concrete base and named a telephone pole. Telrex sells first beam.

200 Million BC - Second beam sold by Telrex. Installer falls from top of pole. First safety belt sold.

100 Million BC - First mountain appears. Repeater invented.

50 Million BC - It is decided by WARC that "seek you" is too cumbersome to send on CW, so abbreviation "CQ" is adopted.

4 Million BC - Humans replace swine as dominant species. The name "Ham Operator" hangs on, however.

3 Million BC - Dugout canoe invented. Maritime Mobile Net formed on 14.313 mHz.

2 Million BC to 800 AD - Nothing much happens for a long time.

900 AD - Chinese invent gunpowder. BY1AA is first "Big Gun" DXer.

1790 AD - Ben Franklin invents long wire receiving antenna. Ground switch invented.

1961 AD - Second repeater erected. First repeater group refuses to change frequency. First frequency coordinator appointed.

1990 AD - Amateur radio humor sinks to a new low.

Published in the spring 1990 Handi-Hams Newsletter, originally

appeared in the LYERS Newsletter.